

AMENDMENT UNDER 37 C.F.R. § 1.116  
U.S. APPLICATION NO. 09/833,666  
ATTORNEY DOCKET NO. Q64029

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

1. (*Currently Amended*) A method of compensating for a possible delay between two or more radio transmission paths in space diversity radio transmissions, said method comprises:

receiving a first analog signal;

receiving at least one second analog signal;

sampling said first analog signal and said at least one second analog signal signals to obtain a first digital signal and at least one second digital signal, respectively, a possible delay being present between the first digital signal and the at least one second digital signals signals; and

sending said digital signals to respective equalizers;

delaying, in a digital manner, either one of said first digital signal or and said at least one second digital signal by a period equal to an integer multiple of the sampling period, and

optionally

recovering, at equalization, the difference between the imposed delay and the real delay.

2. (*Previously Presented*) A method according to claim 1, wherein delaying comprises calculating the value of the integer multiple, wherein calculating the integer multiple comprises:

realizing delayed replicas  $r_{1j}(kT_{sa}) = s_1(kT_{sa} - jT_{sa})$  and  $r_{2i}(kT_{sa}) = s_2(kT_{sa} - iT_{sa})$  of said first and said at least second digital signals, with  $0 \leq j \leq N_1$  and  $0 \leq i \leq N_2$ ,  $N_1 T_{sa}$  being the maximum assumable delay of the first signal with respect to the at least one second signal and

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$N_2 T_{sa}$  being the maximum assumable delay of the at least one second signal with respect to the first signal;

calculating cross-correlations

$$xc_{1j} = E \left\{ \sum_m \sum_n a_n a_m * g_2 * (kT_{sa} - mT) g_1 (kT_{sa} - nT - \tau - jT_{sa}) \right\} \text{ with } 0 \leq j \leq N_1,$$

$$xc_{2i} = E \left\{ \sum_m \sum_n a_m a_n * g_1 (kT_{sa} - nT - \tau) g_2 (kT_{sa} - mT - iT_{sa}) \right\} \text{ with } 0 \leq i \leq N_2,$$

between the various delayed replicated signals, where \* denotes the complex conjugate operation and  $E\{\}$  the time average operation; and

deriving the maximum value of said cross-correlations as  $i$  and  $j$  vary, namely

$$M = \max_{i,j} (|xc_{1j}|^p, |xc_{2i}|^p) \text{ said maximum value corresponding to the value of the integer}$$

multiple.

3. (*Previously Presented*) A method according to claim 2, wherein the method further comprises selecting the delayed replica to be sent to said equalizers as a function of the information related to the maximum of the calculated cross-correlations.

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4. (*Currently Amended*) An apparatus for compensating a delay between two or more radio transmission lines in space diversity radio transmissions, said apparatus comprising:

means for receiving a first analog signal;

means for receiving at least one second analog signal;

means for sampling the first analog signal and the at least one second analog signal to obtain a first digital signal and at least one second digital signal, respectively, a delay being possibly present between the first digital signal and the at least one second digital signalsignals;

and

equalizers receiving said digital signals at their respective inputs ~~the input~~;

means for delaying, in a digital manner, either one of said first digital signal or ~~and~~ said at least one second digital signal by a period equal to an integer multiple of the sampling period, and

equalizer means capable of restoring the difference between an imposed delay and the real delay.

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5. (*Previously Presented*) An apparatus according to claim 4, wherein said delay means comprise means for calculating the value of the integer multiple, wherein said calculation means comprise:

means for realizing delayed replicas  $r_{1j}(kT_{sa}) = s_1(kT_{sa} - jT_{sa})$  and  $r_{2i}(kT_{sa}) = s_2(kT_{sa} - iT_{sa})$  of said first and said at least one second digital signals, with  $0 \leq j \leq N_1$  and  $0 \leq i \leq N_2$ ,  $N_1 T_{sa}$  being the maximum assumable delay of the first signal with respect to the at least one second signal and  $N_2 T_{sa}$  being the maximum assumable delay of the at least one second signal with respect to the first signal;

means for calculating cross-correlations

$$xc_{1j} = E \left\{ \sum_m \sum_n a_n a_m * g_2 * (kT_{sa} - mT) g_1 (kT_{sa} - nT - \tau - jT_{sa}) \right\} \text{ with } 0 \leq j \leq N_1,$$

$$xc_{2i} = E \left\{ \sum_m \sum_n a_m a_n * g_1^* (kT_{sa} - nT - \tau) g_2 (kT_{sa} - mT - iT_{sa}) \right\} \text{ with } 0 \leq i \leq N_2$$

between the various delayed replicated signals, where  $*$  denotes the complex conjugate operation and  $E\{\}$  the time average operation; and

means for deriving a maximum value of said cross-correlations as  $i$  and  $j$  vary, namely

$M = \max_{i,j} (|xc_{1j}|^p, |xc_{2i}|^p)$ , said maximum value corresponding to the value of the integer multiple.

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6. (*Previously Presented*) An apparatus according to claim 5, further comprising switching means for selecting a proper delayed replica to be sent to said equalizer means as a function of information related to the maximum of the cross-correlations calculated.

7. (*Previously Presented*) A computer program comprising computer program code means adapted to perform the method claimed in claim 1 when said program is run on a computer.

8. (*Previously Presented*) A computer-readable medium having a program recorded thereon, said computer-readable medium comprising computer program code means adapted to perform the method claimed in claim 1 when said program is run on a computer.

9. (*Currently Amended*) An apparatus for compensating a delay between two or more radio transmission lines in space diversity radio transmissions, said apparatus comprising:

- a first receiver that receives a first analog signal;
- a second receiver that receives at least one second analog signal;
- a sampling circuit that samples the first analog signal and the at least one second analog signal to obtain a first digital signal and at least one second digital signal, respectively, a delay being possibly present between the first digital signal and the at least one second digital signalsignals;
- equalizers that receive said digital signals at their respective inputs;

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a digital delay circuit that digitally delays either one of said first digital signal or and said at least one second digital signal by a period equal to an integer multiple of the sampling period, and

a restoring equalizer that restores the difference between an imposed delay and the real delay.

10. (*Currently Amended*) An apparatus according to claim 9, wherein said digital delay circuit comprises a calculation circuit for calculating the value of the integer multiple, wherein said calculation circuit:

a delay circuit that realizes delayed replicas  $r_{1j}(kT_{sa}) = s_1(kT_{sa} - jT_{sa})$  and  $r_{2i}(kT_{sa}) = s_2(kT_{sa} - iT_{sa})$  of said first and said at least one second digital signals, with  $0 \leq j \leq N_1$  and  $0 \leq i \leq N_2$ ,  $N_1 T_{sa}$  being the maximum assumable delay of the first signal with respect to the at least one second signal and  $N_2 T_{sa}$  being the maximum assumable delay of the at least one second signal with respect to the first signal;

a correlation circuit that calculates cross-correlations

$$xc_{1j} = E \left\{ \sum_m \sum_n a_n a_m * g_2(kT_{sa} - mT) g_1(kT_{sa} - nT - \tau - jT_{sa}) \right\} \text{ with } 0 \leq j \leq N_1,$$

$$xc_{2i} = E \left\{ \sum_m \sum_n a_m a_n * g_1(kT_{sa} - nT - \tau) g_2(kT_{sa} - mT - iT_{sa}) \right\} \text{ with } 0 \leq i \leq N_2$$

between the various delayed replicated signals, where  $*$  denotes the complex conjugate operation and  $E\{\cdot\}$  the time average operation; and

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a maximum value circuit derives a maximum value of said cross-correlations as  $i$  and  $j$  vary, namely  $M = \max_{i,j} (|xc_{1j}|^p, |xc_{2i}|^p)$ , said maximum value corresponding to the value of the integer multiple.

11. (*Previously Presented*) An apparatus according to claim 10, further comprising a switch for selecting a proper delayed replica to be sent to said restoring equalizer as a function of information related to the maximum of the cross-correlations calculated.